REMARKS

This application has been reviewed in light of the Office Action dated May 7, 2003. Claims 1-38, 40, 42-52, 54, 56, 57, 59-74, 76, 78-85, 87-89, and 91-116 are presented for examination, of which claims 1, 11, 20, 26, 31-33, 51, 52, 65, 73, 74, 78-80, 96, 97, 108, and 113-116 are in independent form. Claims 39, 41, 53, 55, 58, 75, 77, 86, and 90 have been canceled, without prejudice or disclaimer of subject matter, and will not be mentioned further. Claims 1-36, 38, 40, 42-52, 56, 57, 59-74, 78-85, 87-89, and 91-116 have been amended to define more clearly what Applicants regard as their invention. Favorable reconsideration is requested.

Claims 1-38, 40, 42-52, 54, 56, 57, 59-74, 76, 78-85, 87-89, and 91-116 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,191,797 (*Politis '797*).

As shown above, Applicants have amended independent claims 1, 11, 20, 26, 31-33, 51, 52, 65, 73, 74, 78-80, 96, 97, 108, and 113-116 in terms that more clearly define the present invention. Applicants submit that these amended independent claims, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

The aspect of the present invention set forth in claim 33 is a method for optimizing an expression tree. The expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, where each node of the tree representing at least one region of an object of the image or an operation for combining sub-expressions of the compositing expression. The method includes determining at least a portion of opacity information for at least one node of the tree. The portion of opacity

information simultaneously identifying each opaque region, transparent region and partially transparent region represented by the node. The method also includes optimizing the expression tree by determining obscurance information for at least the node of the tree using the portion of opacity information associated with the node, where the obscurance information indicates at least one visible region represented by the node.

Important features of claim 33 are determining at least a portion of opacity information for at least one node of the tree, where the portion of opacity information simultaneously identifies each opaque region, transparent region and partially transparent region represented by the node, and optimizing the expression tree by determining obscurance information for at least the node of the tree using the portion of opacity information associated with the node, where the obscurance information indicates at least one visible region represented by the node.

As described at page 17, lines 10 to 18, of the present specification, for obscurance analysis, the homogeneous regions of the image are of interest. That is, those regions corresponding to parts of objects that are different levels of opaqueness (i.e., fully opaque, fully transparent or partially transparent regions). These regions are needed in order to take full advantage of possible optimization opportunities that exist in the presence of the various operations (i.e., OVER, IN, OUT, ATOP, etc. . . .). Operators such as OVER require the fully opaque regions to determine where one object follows another, whereas operators such as IN and OUT require the fully transparent regions to determine how an object clips out parts of other objects.[1]

1/It is to be understood, of course, that the claim scope is not to be limited by the details of the described embodiments, which are referred to only to facilitated explanation.

As further described at page 17, lines 25 to 28, of the present specification, each leaf node of a quadtree is assigned a value representing the colors black, white and grey, respectively, depending on whether a corresponding region in the image space is fully opaque, fully transparent or partially transparent, respectively. Obscurance quadtrees are computed from the opacity quadtrees, as described at page 21, lines 12 to 22, of the present specification. An obscurance quadtree represents the union of all obscured regions represented by a corresponding leaf node. As each node in a compositing tree inherits the obscured regions of the nodes parent node, the obscurance quadtrees are propagated in a downwards tree traversal. The process concludes with a final obscurance quadtree which can be used to limit the amount of processing required to render the graphics object corresponding to the particular leaf node.

Politis '797 relates a method of optimizing an expression tree for compositing an image where the region represented by a node is compared to a quadtree corresponding to a region represented by another node. As disclosed at column 5, lines 25 to 28, a quadtree corresponding to unobscured portions of graphical elements is returned from a node for possible further processing at other nodes. As further disclosed at column 15, lines 14 to 25, the unobscured portions of the graphical elements are those portions which have the potential to obscure other graphical elements. In the example of column 15, a quadtree is created representing the region of an image occupied by a circle. The quadtree is passed back to the parent node of the node representing the circle and is stored as the obscuring region of the node representing the circle. The intersection of this quadtree and another quadtree representing the unobscured portions (i.e., those portions which have the potential to obscure other graphical elements) of the other child node of the parent node is

then determined. The result of the intersection is a quadtree representing the region of the parent node which can obscure other graphical elements of the corresponding expression tree. That is, the quadtree represents opaque or partially opaque regions of the parent node since transparent regions by their very nature do not have the potential to obscure other graphical elements.

Column 3, line 61, to column 4, line 63, of *Politis '797* discusses using alpha values in compositing operations. *Politis '797* discusses a value Do representing a resultant alpha channel value of a compositing operation, an alpha value Ao corresponding to a pixel having a color Ac and an alpha value Bo corresponding to a pixel having a color Bc. The values Ao and Bo are used to determine the value Do representing the resultant alpha channel value. *Politis '797* uses the alpha channel values, Ao and Bo, in determining the resultant alpha channel value of a compositing operation performed to determine the region of a node which can obscure other graphical elements of the corresponding expression tree. The alpha values of *Politis '797* merely represent the opacity of one pixel having a certain color. A group of pixels may have different opacity values and therefore different levels of transparency or opaqueness. However, an alpha value associated with one pixel, as disclosed by *Politis '797*, does not simultaneously identify each opaque region, transparent region and partially transparent region represented by a node. Further, *Politis '797* does not even suggest determining transparent regions associated with a node since transparent regions by their nature do not have the potential to obscure other graphical elements.

Accordingly, Applicants submit that nothing in *Politis '797* would teach or suggest determining at least a portion of opacity information for at least one node of the tree, the portion of opacity information simultaneously identifying each opaque region,

transparent region and partially transparent region represented by the node. As discussed above, these regions are needed in order to take full advantage of possible optimization opportunities that exist in the presence of various operations. Further, Applicants submit that nothing in *Politis '797* that would teach or suggest optimizing the expression tree by determining obscurance information for at least the node of the tree using the portion of opacity information that simultaneously identifies each opaque region, transparent region and partially transparent region represented by the node.

Applicants submit that claim 33 is clearly patentable over *Politis '797.*

Independent claims 1, 11, 20, 26, 31, 32, 51, 52, 65, 73, 74, 78-80, 96, 97, 108, and 113-116 include substantially similar features of determining at least a portion of opacity information for at least one node of the tree, where the portion of opacity information simultaneously identifies each opaque region, transparent region and partially transparent region represented by the node, and optimizing the expression tree by determining obscurance information for at least the node of the tree using the portion of opacity information associated with the node, where the obscurance information indicates at least one visible region represented by the node, as discussed above in connection with claim 33. Accordingly, claims 1, 11, 20, 26, 31, 32, 51, 52, 65, 73, 74, 78-80, 96, 97, 108, and 113-116 are believed to be patentable for at least the same reasons as discussed above in connection with claim 33.

A review of the other art of record has failed to reveal anything which, in the Applicants opinion would remedy the deficiencies of the art discussed above as references against the independent claims of the present application. Those claims are therefore believed patentable over the art of record.

The other rejected claims in this application depend from one or another of the independent claims discussed above, and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

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